IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 2, June 2023

Design of Water Supply Scheme for Rural Area

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Abstract: *Design of water supply scheme in around Rural Areas. During classify toward fulfil the water command of the constantly rising population, it is necessary toward supply the plenty with consistent capacity of water through the designed system of pipe. Intended for this use the particulars provide via the IPH (Irrigation and Public Health Department) department, the common features of the region similar to in order on the chief water basis, population of the region, insist of water, requirement of the pumps, distribution network and water tanks are essential for efficient design of water distribution system. Water distribution system deals with the supplying of potable water for a village which can be useful for both drinking and wholesome purpose. The main stages of distribution system are collection works, transmission works, purification works and distribution works. It includes estimation of future population (population forecasting) by using various methods, layout of pipes and design of valves and joints, finding out the head losses etc.*

Keywords: Rural area, Water supply scheme, Safe drinking water

I. INTRODUCTION

The total volume of water on Earth is estimated at 1.386 billion km³ (333 million cubic miles), with 97.5% being salt water and 2.5% being fresh water. Of the fresh water, only 0.3% is in liquid form on thesurface.
Providing safe drinking water for the entire population in the country has become a challengingtask of the Governments and all Sector Institutions.
In the selected Village, there is scarcity of water to overcome this problem we are going to design watersupply scheme as well as suggesting measures for recharging of borewell and spring in this area.

Importance of water supply scheme

The available water in the locality is used in the best possible manner and its misuse and wastage are avoided to a considerable extent.
The installation and maintenance of the water supplyscheme grant opportunities of employment to the local people.
The public in general gets treated reliable water forconsumption and other uses.

Selection to study area

The village Nangargaon is newly developed. Area ofNangargaon village situated at a distance of about 10km from the Gargoti, Taluka Bhudargad and DistrictKolhapur.
At present the main water resource of thestudy area is Well and Borewell.The village of Nangargaon is divided into various zones for proper distribution of water. The economical water distribution system is designed inpresent study for village.

II. LITERATURE REVIEW

Ashok, Akhil Gurijala, SS. Asadi (2020) died on Water Distribution Network in Around Rural Areas. During classify toward fulfil the water command of the constantly rising populace, it is necessary toward supply the plenty with consistent capacity of water through the designed system of pipe. intended for this use the particulars provide viathe IPH (Irrigation and Public Health Department) department, the common features of the region similar to in order on the

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chief water basis, populaceof the region, insist of water, requirement of the pumps, distribution network and water tanks are essential for efficient design of water distribution system

Harshan K G, Keerthana L Madhu,Anjali A. (2018)
They are studied on Design of Water Distribution Network for a Small Rural Area. With the tremendous growth of population, the demand for water also increases. In order to supply sufficient quantity of water, a good water distribution networkis necessary

Uzair (Sam) Shamsi
Studied on GIS Applications for Water Distribution Systems. The GIS applications that are covered include, development of hydraulic models, creation of thematic maps of the model output results, network simplification (skeletonization) for hydraulic modelling, estimation of node demands, estimation of node elevations, water main isolation (i.e., identifying the valves to be closed for repairing or replacing a broken water main), and delineation of pressure zones.

III. METHODOLOGY

1. Design of Water Supply Scheme in theRural Area.
2. Selection of study area.
3. Collection of data.
4. Data analysis.
5. Survey of existing water supplyarrangement.
6. Population forecasting.
7. Requirement of water supply.
8. To study of available water.
9. To study quality of water.
10. To design the Intake well
11. To Design the Filter House.

MAPS
A Digital Elevation Model (Alos Pulsar E-trex(5m)), contour map, satellite image of USGS Landset-2 of Nangargaon village, Kolhapur toposheet from Bhavan.

SOFTWARE
a. GIS 2.10,
b. Erdas 9.1.
c. Global Mapper

The available topo sheets and Google images & DEM were used to prepare the base maps such as contour map, LULC map, Watershed delineation, Drainage map etc. The obtained base maps were subjected to GIS analysis where Erdas 9.1 and QGIS 2.10 were used. Erdas 9.1 is used for the classification of satellite data into supervised and unsupervised classifier. Supervised classifier is used to code the pixels manually which is done by field work. Land use cover or land use pattern maps were obtained by using Erdas 9.1. Available satellite data was digitized, geo-coded and georeferenced. Further analysis was made by using QGIS Swat analysis. This was used to obtain all other maps like drainage pattern map, contour map and elevation map.

IV. REQUIREMENT OF WATER SUPPLY

Demand of Water:
The standard norm for demand are given below:

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Types of demand:

- Domestic purpose
- Civic or public purpose
- Institutional and commercial demand
- Industrial demand

Domestic Purpose:

It is defined as the water needed for drinking, cooking, washing, gardening, and sanitary purpose.

As per IS 1172-1993, specification the minimumdomestic consumption for a village with full flushingsystem should be taken as 200 lit/head/day although it can be reduced to 135 lit/head/day. It may vary from 50 - 350 lit/head/day depending upon the standard of living. It covers 55 – 60% of total demand.

Institutional and Commercial Demand

It is defined as water needed for commercial purposeand institutional requirements.

It includes offices, hostels, Schools, Restaurants, commercial complex, hotels, colleges, etc. This quantity vary with nature of city and with the numberand types of commercial establishment and institutions present in it.

Generally a per capita demand of 20 lit/head/day isusually considered to meet such commercial and institutional water demand.

It covers 5 - 10 % of total demand.

Industrial Demand

It is defined as water needed for differentindustries for their processing.

The industrial water demand represent the water demand of industries, either existing or proposedindustries in the area.

The quantity may vary with number andtypes of industries present in the area.

The ordinary per capita consumption on account of industrial needs of a city is generally taken as 50 lit/capita/day, which may suffice only to meet the water demand of small scattered industries.

It covers 10 - 20 % of total demand.

The demand of water is calculated as per standard norm as 135 litres/capita/day and all other demands like civic, institutional, business of the village are also considered as per standard norms.

V. RESULT

Sr. No.	Use	Consumption/Capita/Day
1.	Bathing	55 litres
2.	Flushing of latrines etc.	30 litres
3.	Washing of clothes	20 litres
4.	Washing of utensils	10 litres
5.	Washing and cleaning of house	10 litres
6.	Cooking	5 litres
7.	Drinking	5 litres

VI. CONCLUSION

1. The project "Design of water supply scheme for rural area" is related to the subject of water supply and irrigation engineering. The reason of choosing this subject is to fulfil the water supply demand in the selected village. This village is located in Taluka Bhudhargad name Nangargaon where this village is facing water supply problems.

2. After visiting and observing this village, we come to know that there is scarcity of water in this village. The area of village is 591 Ha. and population of village 1463 ad per 2011 census of India. There are 230 houses and they are divided into four lanes.

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3. After surveying all above the conditions of this village we came know that existing source of water cannot fulfill the demand of nangargaon village hence we have decided the water supply the village with new source of water.
4. As per the water budget calculation there is scarcity of water in the village the available source is not able to fulfill the water in a spring and a cube well.
Available source is not able to fulfill the water demand for existing population in summer season. Also, it is unable to fulfill the water demand for forecasted population. Hence a new source is selected in the nearby1 area ie. Mangnoor lake.
5. The quality of water is tested and all parameters are found approximately within desirable limits. The head is calculated and found it is 147 meters. By performance charts the pump capacity is decided as 6.5 HP.
6. The filtration unit is designed with basis components as rapid sand filter and chlorination units. Also the structural design of filtration units is carried out.
7. The capacity of existing ESR is less Hence new ESR is suggested. 1 lack of capacity structural design of purposed ESR is done.

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